

Abstract of Disclosure

A fuel injector having an arrangement to stabilize the temperature of its components within an engine cylinder in a direct injection application. The fuel injector includes a body, an armature, a needle, a swirl generator, and a seat. The body has an inlet portion, an outlet portion, a body passage, extending from the inlet portion to the outlet portion along a longitudinal axis of the fuel injector. The armature is located proximate the inlet portion of the body, and is operatively connected to the needle. The needle is provided with a substantially uniform cross-sectional area, and the body is selected to surround the needle and form a body passage that has an average cross-sectional area less than two times the substantially uniform cross-sectional area of the needle. In particular, the body includes a neck, which is preferably a cylindrical annulus, that has an inner diameter that is no more than 50% greater than a diameter of a preferred cylindrical needle, and an outer diameter that is no less than 100% greater than the inner diameter. The swirl generator is located proximate the needle and the seat. The needle engages the seat, which is disposed at the outlet portion of the body. The seat, preferably, includes a first surface exposed to the body passage and a second surface exposed to an exterior of the fuel injector. The first surface is spaced from the second surface a defined distance along the longitudinal axis. Alternatively, the first surface has at least one cut-out configuration, which is preferably, at least one volume that defines at least one wall that extends from the first surface for a fraction of the defined distance into an interior of the seat.